

CRIME BUSTERS

Cobra Invitational
Saturday, January 24, 2015



ANSWER KEY

	Type of Analysis	Total Correct	Total Possible Points	%	Score
Part A	Qualitative Analysis		14	50	
Part B	Hair, Fibers, Plastics ***Metals (see note)		5	10	
Part C	Chromatography		9	5	
Part D	Fingerprints		2	10	
Part E	Analysis		21	25	
Final Score/Final Rank					

***NOTE: Metals for all participants were mistakenly included in the scoring for Part B.

CASE DETAILS

On the afternoon of January 23, 2015, Mrs. Long returned from her lunch break to find a crowd of students peering into her classroom. As she made her way through the crowd of students, what she found when she entered the classroom made her scream with horror. Containers that previously held Science Olympiad training samples had been thrown everywhere. The powders that were once inside the containers were spread all over the lab benches, walls, and floor; a few of the powders even appeared to be mixed together. The lids had been taken off of the liquid containers, and a detectable odor filled the room. Lab equipment had been overturned, and there were well defined white powdery fingerprints found on the glass fragments on the floor. What looked like strands of hairs were intertwined with the fibers of the mop that the custodian had brought to the classroom to begin cleaning up the mess. Then, Mrs. Long discovered a note attached to the whiteboard. Mrs. Long could barely make out the words that had smudged after her sweaty hands touched the ink on the note. What she could decipher through the smeared ink read as follows:

I refuse to take any more of these stupid Science Olympiad practice tests. Because of all these Saturday afternoon Crime Busters practices, I have had to miss sleeping in late and watching my favorite Saturday morning cartoons for the last several months. Besides, the Can't Judge a Powders teams only have to analyze ONE powder while the Crime Busters teams have to identify powders and hairs and liquids and metals and polymers and whatever else Mrs. Long puts on those practice tests...not to mention that I have to write an essay every week and wash dishes. I can't wait until this competition is over. I am so done with Science Olympiad!!

The local police department was called, and the four students being coached by Mrs. Long were pulled from their fourth period elective classes for questioning. "Who did this?" questioned Mrs. Long of her four students. Everyone sat quietly, staring at each other and looking around the room. "I know how to get to the bottom of this," exclaimed Mrs. Long, "I know exactly who to call to investigate and help me to determine the culprit—the Cobra Invitational Crime Busters Teams."

Your mission, should you choose to accept it, is to review the case notes, identify all of the collected evidence, and determine who was involved in the destruction of Mrs. Long's classroom.

CRIME SCENE NOTES & SUSPECT LIST

SUSPECT #1 - Elise

- 8th grade student, black hair, brown eyes
- Loves math, science and writing but intensely dislikes reading
- Likes to sew her own clothes and create her own fashion trends
- Enrolled in 4th period home economics class because she loves to cook and try out new recipes
- Doesn't understand why Mrs. Long would waste food ingredients and good fabric on science lessons
- Hobbies: Academic whiz, Sports fanatic, tennis
- Evidence found on her during the time of investigation:
 - Item #1 was found in a sandwich bag inside her lunch bag
 - Item #2 was adhering to the apron that she was wearing in home economics class
 - Item #3 was found in a small plastic bottle inside her lunch bag
 - Pen #1 was taken from her purse
 - Fingerprint records were supplied at the time of Crime Busters registration



SUSPECT #2 – Marie

- 7th grade student, brown hair, green eyes
- Loves science but is a little clumsy when it comes to hands-on learning in the classroom
- Is always apologizing to Mrs. Long for knocking over lab equipment during Science Olympiad practice
- Enrolled in 4th period homeroom when she typically enjoys a sweet snack with completing homework assignments
- Has a big sweet tooth and enjoys a powdered donut as often as possible
- Very athletic and academically involved student
- Hobbies: eating, cooking, spending time with her new puppy, basketball, volleyball, running, reading
- Evidence found on her during the time of the investigation:
 - Item #4 was found in her lunch bag
 - Item #5 was found adhering to her lips and in the crevices of her mouth
 - Pen #2 was taken from her homework supply box
 - Fingerprint records were supplied at the time of Crime Busters registration



SUSPECT #3 - Joshua

- 7th grade student, black hair, brown eyes
- Is the oldest child in his family
- Enrolled in 4th period advanced gym class
- Prefers to wear khaki pants and polyester blend dress shirts
- Tends to be very neat, clean, and extremely health conscious
- Hobbies: singing, acting, karate, cross country, biking
- Always has extra pencils or blue or black pens to loan to a classmate
- Loves to find ways to create explosive reactions during Science Olympiad practices
- Doesn't have any pets but visits his aunt frequently who owns two dogs
- Evidence found on him at the time of investigation:
 - Item #6 found in a plastic bottle in his backpack
 - Item #7 was found in his gym bag
 - Item #8 was found in a squirt bottle in his backpack
 - Pen #3 was the only pen in his backpack; all others were loaned out
 - Fingerprint records were supplied at the time of Crime Busters registration



SUSPECT #4 – Andrew

- 6th grade student, brown hair, blue eyes
- Enrolled in 4th period art class
- Learning how to create new art work with different types of metals
- Hobbies: drawing, swimming, reading comic books, playing video games, sculpting
- Has a pet dog and regularly visits several friends who own dogs and cats
- Typically gets lost in artistic expression during Science Olympiad practices
- Evidence found on him during the time of investigation:
 - Item #9 was in his art bag
 - Item #10 was in his art bag
 - Item #11 residue was on his sleeves
 - Item #12 was stuffed into his pants pocket
 - Pen #4 was taken from his art supply box
 - Fingerprint records were supplied at the time of Crime Busters registration



EVIDENCE FOUND IN MRS. LONG'S CLASS

Powder – Item #13

Powder – Item #14

Powder – Item #15

Powder – Item #16

Two Powders mixed together – Item #17

Hair – Item #18

Chromatography of the ink from the note was performed in water by the Advanced Placement chemistry class (See the chromatography station for the ink results)

Fingerprint shown below



DATA ANALYSIS & IDENTIFICATION:

Identify all the items of evidence. (1 point for each correct answer)

1 – SALT	11 – IRON
2 – BAKING SODA	12 – What type of fiber is it? Animal, vegetable, or synthetic? VEGETABLE FIBER (COTTON)
3 – VINEGAR	13 – YEAST
4 – GELATIN	14 – SALT
5 – SUGAR	15 – FLOUR
6 – VITAMIN C	16 – BAKING SODA
7 – What type of fiber is it? Animal, vegetable, or synthetic? SYNTHETIC (SPANDEX)	17 – (Identify 2 powders) FLOUR & SUGAR
8 – ALCOHOL	18 – What type of hair is it? Human, Cat, or Dog? DOG
9 – GYPSUM	19 – Which suspect(s) fingerprint matches the one from the crime scene? SUSPECT #1 (ELISE)
10 – COPPER	20 – What is the pattern of the fingerprint left at the crime scene? WHORL

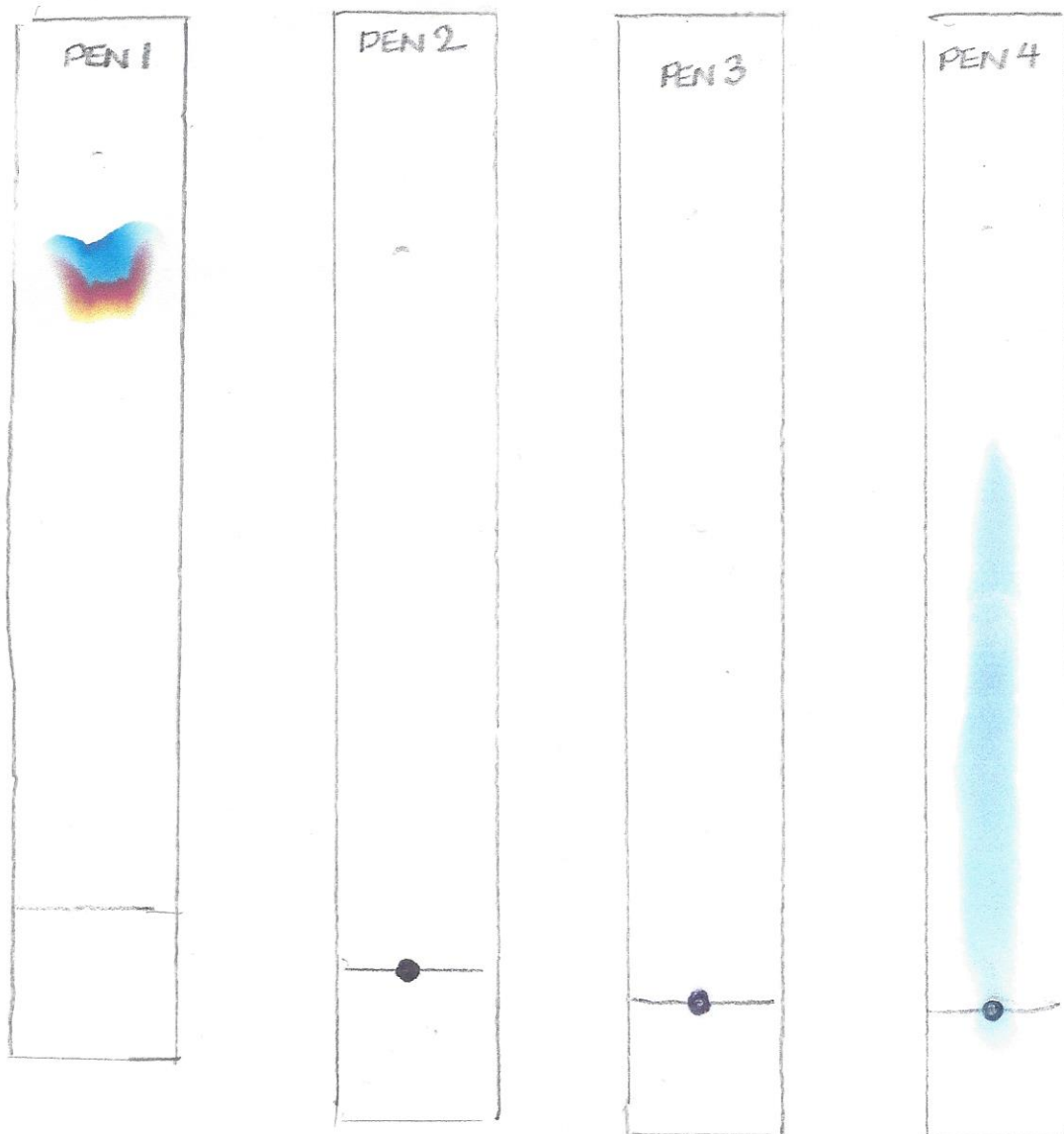
ATTACH THE RESULTS OF THE PAPER CHROMATOGRAPHY FOR EACH SUSPECT'S INK PEN BELOW (All four papers must be attached for full credit):

Which suspect's pen matches the one in the developed paper chromatography?

1 point for correctly indicating that the pen of SUSPECT #1 (ELISE) matched.

4 points possible: 1 point for each of the developed paper chromatography strips that are labeled with the number of the pen and attached below.

4 points possible: 1 point for each chromatography strip that looks similar to the corresponding strips below



WHO IS MOST LIKELY THE SUSPECT(S)? PROVIDE DETAILED REASONS ABOUT HOW YOU CAME TO YOUR CONCLUSION.

5 points for correctly identifying SUSPECT #1 (Elise) as the most likely suspect.

8 points possible: 2 points each for mentioning the following reasons:

1. Salt was found in a sandwich bag inside her lunch bag and found at the crime scene.
2. Baking soda was adhering to her apron and found at the crime scene.
3. Pen #1 was taken from her purse, and the chromatography of Pen #1 matched the chromatography of the pen ink from the note.
4. The fingerprint from her pinky matched the one left at the crime scene.

2 points possible: 1 point each for mentioning the following reasons:

1. There were several cooking products found at the crime scene that might implicate her since she has access to cooking ingredients from home economics class and from her own personal interest in cooking
2. Possible motive: She doesn't understand why Mrs. Long would waste food ingredients and good fabric on science lessons and may have retaliated by trashing the room and leaving the note

EXPLAIN WHY YOU DID NOT SELECT THE OTHER SUSPECTS AND PROVIDE EVIDENCE.

6 points possible: (ANSWERS MAY VARY)

Marie (2 points for any two reasonable reasons)
Joshua (2 points for any two reasonable reasons)
Andrew (2 points for any two reasonable reasons)

A general statement that did not distinguish each of the remaining suspects but provided at least two reasons (3 points only)